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U S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

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U.S. APPLICATION NO.
09/719128

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/US99/13065	09 June 1999 (09.06.99)	09 June 1998 (09.06.98)

TITLE OF INVENTION
DATABASE FOR USE IN METHOD AND APPARATUS FOR DISPLAYING TELEVISION PROGRAMS AND RELATED TEXT

APPLICANT(S) FOR DO/EO/US
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Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b ☐ has been transmitted by the International Bureau.
   c. ☒ is not required, as the application was filed in the United States Receiving Office (RO/LUS).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items below concern other document(s) or other information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ SMALL ENTITY Assertion: Applicant(s) and any others associated with it/them under 37 CFR § 1.27(a) are a small entity.
17. ☒ International search report.
18. ☐ International preliminary examination report.
19. ☐ Written Opinion
20. ☐
21. ☐

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U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY DOCKET NO
09/719128	PCT/US99/13065	34758/WWM

☒ The following fees are submitted: (see Note (1) below)	CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-5)):		
Search Report has been prepared by the EPO or JPO **$860.00**		
International preliminary examination fee paid to USPTO (37 CFR 1.482) ... **$690.00**		
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) **$710.00**		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$1,000.00**		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 690	
Surcharge of **$130** for furnishing the oath or declaration later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	3 -20=	0	X $18	$ 0	
Independent Claims	1 -3=	0	X $80	$ 0	
Multiple dependent claim(s) (if applicable)			+ $270	$ 0	
TOTAL OF ABOVE CALCULATIONS =				$ 690	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				$	
SUBTOTAL =				$ 690	
Processing fee of **$130** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$	
TOTAL NATIONAL FEE =				$ 690	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property				$	
TOTAL FEES ENCLOSED =				$ 690	
Note (1): **The basic national fee must be paid when filing this application. The 20-month time limit (37 CFR § 1.494) and 30-month time limit (37 CFR § 1.495) are not extendable.**				Amount to be: refunded	$
				charged	$

a. ☒ A check in the amount of **$ 690** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No._____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **03-1728**. A duplicate copy of this sheet is enclosed.

NOTE (2): **Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

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DATABASE FOR USE IN METHOD AND APPARATUS FOR DISPLAYING TELEVISION PROGRAMS AND RELATED TEXT

BACKGROUND OF THE INVENTION

This invention relates to the field of television and, more particularly, to a database for use in displaying television program information on a television screen through the use of a television program schedule system.

Television program schedule systems, such as the one disclosed in application Serial No. 08/475,395, allow users to visually inquire into television viewing options through the use of a program guide. In these systems television program information is stored in an electronic memory connected to the television receiver. A database is used to organize and store television program information within the electronic memory.

SUMMARY OF THE INVENTION

According to the invention television program schedule data is received from the vertical blanking interval of a television signal, analyzed, and stored within a database. The database contains a static area for information which is not subject to frequent change and a dynamic area for information which will frequently change.

Within each area information is stored within data structures which enable a television program schedule system to interpret and analyze the information. The data structures are designed to facilitate the rapid lookup and display of program information. The data structures are also designed to reduce the size of the electronic memory and to increase the efficiency of searches through the data.

The system facilitates a method for sorting the database and creating various displays of information to the user. In the current embodiment such lookups, sorts and displays include: a program guide which displays schedule information for a specific time or channel; a primary category guide which displays schedule information for a category of programs, i.e. movies, sports, children's shows, etc.; a sub category guide which displays schedule information for a sub-category of programs, i.e. under the primary category "movies" the sub-categories could be drama, action, comedy, etc.; a recording queue which facilitate the scheduling of recordings and the display of programs set to be recorded; a titles guide which displays information for programs by title, rather then by station or time; a conflict resolver which displays information about conflicts in time or channel when the user desires to watch, or record, two programs that conflict; and a when else feature which searches and displays when a selected program will air.

The database also contains a channel map which is used to link television guide sequence numbers with data providing channel numbers and station call letters. The database also contains a channel inhibit feature which allows the user to block the display of program information for a certain channel or channels.

The database is periodically updated through the use of a designated data providing channel so that updated television program information is always available for operator selected program guides. In an alternate embodiment each channel provider can independently update schedule data for television programs appearing on that channel.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of specific embodiments of the best mode contemplated of carrying out the invention are illustrated in the drawings, in which:

FIG. 1 is a diagram of an electronic memory that illustrates the static and dynamic areas of memory.

FIG. 2 is an illustration of a show information package data structure.

FIG. 3 is an illustration of a section of a show information package data structure.

FIG. 4 is a representation of the pre-established time list data structure contained in the static area of the database.

FIG. 5 is a representation of a section of a show information package data structure.

FIG. 6 is a representation of the channel map data structure contained in the static area of the database.

FIG. 7 is a representation of the control array data structure contained in the static area of the database.

FIG. 8 is a representation of the call letter map data structure contained in the static area of the database.

FIG. 9 is a representation of the record queue data structure contained in the static area of the database.

FIG. 10 is a diagram of the download packet received by the database.

FIG. 11 is a table illustrating the memory priority scheme employed by the database.

FIG. 12 is a representation of the memory bit map employed by the database.

FIG. 13 is a schematic block diagram of a television receiver that has an electronic television program guide incorporating the principles of the invention.

FIG. 14 is a time specific program guide generated by the principles of the invention.

FIG. 15 is a channel specific program guide generated by the principles of the invention.

FIG. 16 is a title guide generated by the principles of the invention.

FIG. 17 is a title search by letter guide generated by the principles of the invention.

FIG. 18 is a program category guide generated by the principles of the invention.

FIG. 19 is a diagram of the download packet received by the database.

FIG. 20 is a diagram of the packet stored by the database.

DETAILED DESCRIPTION OF A SPECIFIC EMBODIMENT

In the following embodiments of the invention, common reference numerals are used to represent the same components. If the features of all the embodiments are incorporated into a single system, these components can be shared and perform all the functions of the described embodiments.

FIGS. 13 to 15 are taken from application Serial No. 08/475,395. With reference to FIG. 13, a source of television signals 10 such as a terrestrial antenna, or a cable is connected to a television tuner 11. The output of tuner 11 is a modulated intermediate frequency signal containing video and audio television information. Tuner 11 is connected by an intermediate frequency amplifier (IF AMP) 12 to a picture detector (PICTURE DET) 13 and a sound detector (SOUND DET) 14, which produce base band video and audio signals, respectively. The audio signal is coupled by a sound amplifier (SOUND AMP) 15 to a loudspeaker 16. The video signal is coupled by a video amplifier not shown to one input of a switch 18. Sound detector 14 and picture detector 13 are connected to the audio and video inputs, respectively, of a video cassette recorder (VCR) 17. (Alternatively, television signal source 10 could be directly connected to the RF input of VCR 17, if its internal tuner and demodulating circuitry is to be utilized.) The output of VCR 17 is connected to the other input of switch 18. The output of switch 18 is connected to one input of a conventional picture-in-picture (PIP) integrated circuit chip 19. The output of PIP chip 19 is connected to the video input of a television receiver or monitor (TV) 20 having a screen (not shown).

An updatable data base of the schedule of program listings of all the available channels for a prescribed period of time, e.g. a day or a week, is electronically stored in a program schedule memory 22. These program listings typically include for each program the title, a program description, the day of the week, the start time of the day, the program length, and the channel on which the program is transmitted and thus available for reception at source 10. In a preferred embodiment of the invention, the period of time for which the program listings are stored is different for the guides, depending upon viewer priorities and preferences. For example, the information needed to display the TISPG and CSPG may be stored for one or two days and the information needed to display the TSPG may be stored for a week or more. The data base can be updated by a continuous data link in the vertical blanking interval (VBI) of one television channel broadcast to the television receiver in well known fashion. Alternatively, the data base can be updated by unplugging memory 22 and replacing it with a memory having the updated data base. Memory 22 is connected to a microprocessor 24 that is programmed to control the operation of the described equipment. An operating program for microprocessor 24 is stored in a read only memory (ROM) 26. A viewer input device 28, preferably in the form of a remote IR controller, is coupled to microprocessor 24 to provide commands from the viewer. A video processor 30 is coupled to microprocessor 24. When the viewer wishes to see television program listings, microprocessor 24 recalls a portion of the program schedule data base from memory 22

and couples it to video processor 30, where the program listings are formatted for display. Preferably, the information stored in video processor 30 is a bit map of what is displayed on the screen of television receiver 20. Video processor 30 is connected to the other input of PIP chip 19. Preferably, viewer input device 28 controls microprocessor 24 by cursor movement on the screen of television receiver 20. To this end, microprocessor 24 and video processor 30 are coupled to a cursor position register 32. (Alternatively, the viewer can select items of information displayed on the screen by keying into viewer input device 28 code numbers assigned to these items.) Microprocessor 24 is also coupled to tuner 11 for channel change, to VCR 17 for play/record selection and start/stop, to switch 18 for selection of one of its inputs, and to PIP chip 19 for selection of the mode of PIP operation.

Several formats of the electronic program guide are shown in FIGS. 14, 15, 16, 17 and 18. Each format has a background area 40 and an overlaid PIP window 42 in the upper left-hand corner of the screen. The real time, i.e., 6:15 p.m., is displayed in a sub-area 42a PIP window 42. Background area 40 includes a banner and message prompting area 43 at the top of the screen, a program description area 44 in the upper right-hand corner of the screen adjacent to PIP window 42, and a program schedule area 46 below areas 42 and 44. Program description area 44 includes the start time and length (duration) of the program being described. The viewer can move a cursor 48 vertically to highlight one of the program listings displayed in area 46. The highlighted background of cursor 48 and the background of program description area 44 are the same color or shade. In each format, the complete, moving images of a currently broadcast television program in real time and the current time are displayed in PIP window 42 and the audio portion of the television program displayed in PIP window 42 is reproduced by the sound system of monitor 20. The information displayed in areas 43, 44, and 46 varies depending upon the format.

In FIG. 14 a time specific program guide comprising listings of programs being broadcast at a specific future time, i.e., 8:00 p.m., is displayed in area 46. The viewer can select the time of the program listings to be displayed at intervals such as one-half hour. The selected future time, i.e., 8:00 p.m., for the program listings displayed in area 46 is shown in a sub-area 43a of area 43. A brief program description of the program listing highlighted in area 46 by cursor 48 is displayed in area 44. The current program being broadcast remains displayed in PIP window 42, and a banner 49 which identifies the current program by channel name, channel number, and program title is displayed between PIP window 42 and area 46 on a background having a different color or shade than cursor 48.

In FIG. 15, a channel specific program guide comprising listings of programs being broadcast on a specific channel is displayed in area 46. All the program listings for a selected channel, i.e., FOX Channel 7, are displayed in area 46, from the currently broadcast program into the future for a specified time period, e.g., 24 hours or until the end of the next day. Area 46 has a column for time and a column for program title; each line of area 46 represents a separate

program listing. The moving, real time images of the current television program are displayed in PIP window 42. If the cursor also highlights the current program, a brief program description of the current program is displayed in area 44. If the cursor highlights another program listing, as shown in FIG. 4, a brief program description of the highlighted program is displayed in area 44 and the current program is identified in banner 49 by time and title.

In FIG. 16, a title guide comprising of listings of programs being broadcast sorted by title is displayed in area 46. All the programs in memory are listed by title in area 46, starting with the letter A, through the letter Z and then titles beginning with numbers or symbols. Area 46 has a column for time and a column for program title; each line of area 46 represents a separate program listing. The moving, real time images of the current television program are displayed in PIP window 42. If the cursor also highlights the current program, a brief program description of the current program is displayed in area 44. If the cursor highlights another program listing, as shown in FIG. 4, a brief program description of the highlighted program is displayed in area 44 and the current program is identified in banner 49 by time and title.

In FIG. 17, a title guide comprising of listings of programs being broadcast sorted by the first letter in the program's title is displayed in area 46. All the programs in memory that begin with the user selected letter are listed by title in area 46. In this example, the user selected the letter "M" to for display. Area 46 has a column for time and a column for program title; each line of area 46 represents a separate program listing. The moving, real time images of the current television program are displayed in PIP window 42. If the cursor also highlights the current program, a brief program description of the current program is displayed in area 44. If the cursor highlights another program listing, as shown in FIG. 4, a brief program description of the highlighted program is displayed in area 44 and the current program is identified in banner 49 by time and title.

In FIG. 18, a program category guide comprising listings of programs that correspond to the selected category is displayed in area 46. All the programs in memory that correspond to the category are listed by title in area 46. Area 46 has a column for time and a column for program title; each line of area 46 represents a separate program listing. The moving, real time images of the current television program are displayed in PIP window 42. If the cursor also highlights the current program, a brief program description of the current program is displayed in area 44. If the cursor highlights another program listing, as shown in FIG. 4, a brief program description of the highlighted program is displayed in area 44 and the current program is identified in banner 49 by time and title.

All four areas of background 40 are formatted in video processor 30. The memory space of video processor 30 corresponding to the area in which PIP window 42 appears on the screen is left blank; i.e., although overlaid on background area 40, PIP window 42 does not cover up any of the information of background area 40. By means of a pair of up/down arrows on viewer input device 28, the viewer can move a cursor 48 vertically to highlight the listing of one of the

currently playing television programs displayed in area 46. Preferably, to reduce delays in displaying the program schedules, all the program listings for the particular screen format are stored in video processor 30, even though only a fraction of them are displayed at the same time. When the cursor reaches the top or bottom listing in area 46, microprocessor 24 recalls further program listings from video processor 30 for display on the screen of television receiver 20.

Preferably, two levels of detail are available for the program description. Normally, the first level detail of the program description is displayed in area 44 as described above. When more detail is desired, the viewer operates input device 28 to display a second level detail of the program description. There are two options for the display of the second level detail. As one option, the second level detail can replace the first level detail in area 44. This has the advantage that the program listings can continue to be seen by the viewer while more detail about the program description is displayed. As the other option, the second level detail can replace the program listings in area 46. This has the advantage that more space is available to display the second level of detail than the first level.

In the preferred embodiment, a television program schedule system ("schedule system") contains a database used to store all the information needed to create program guides and to carry out user requests, such as requests to record specific future programs. The database is stored in a memory accessible by the schedule system microprocessor.

The database contains a static area and a dynamic area. The static area contains several fixed tables used to store data not subject to frequent change such as the call letters for each received channel. The dynamic area is used to store data which is frequently updated such as the actual television program schedule data. Partitioning memory into static and dynamic areas provides for efficient database operation because each area of memory (static or dynamic) can be addressed separately leading to smaller address sizes and faster searches. The partitioning also allows for efficient memory management as only the dynamic area, 301, would need to be pruned.

FIG. 1 depicts the television program schedule database. Static area 300 contains the call letter map, the pre-established time list, the channel map, the control array, the memory map and the record queue. These structures will be described in greater detail below. Dynamic area 301 is used to store television program schedule data that falls within a seven day window. This data takes the form of show information packages (SIPs). These structures are also described more fully below.

In the current embodiment, the database only stores SIPs for the current day, the next day and any SIPs that contain category information for the next seven days. This method of selective storage reduces the memory needed and increases the processing speed of the schedule system. In alternate embodiments the database could be expanded to contain additional days of program schedule data. The number of days for which program schedule data is stored will of course impact on the size of the memory needed and the processing speed of the schedule system.

Data Structures

Data in television schedule database is stored in data structures. The data structures enable a schedule system to interpret the data stored therein. Several of the data structures have a fixed size and reside in the static area 300. Other data structures are of variable size and reside in the dynamic area 301. The fixed data structures include: the pre-established time list, the channel map, the control array, the call letter map, the memory map and the record queue. The variable data structures contain the show information packages.

Show Information Packages

Show information packages are variable length data structures that contain actual television program schedule data. Each show information package contains data for a four hour block of television programming for a specific channel. The show information package size is variable because the number of shows in any four hour block will depend on the duration of each individual show. For example a four hour block may contain: eight - half hour shows, two - two hour movies, four - one hour shows, one - two hour movie and four - half hour shows, etc.

FIG. 2 depicts a show information package. A show information package contains several general data fields which refer to the entire package. These are: amount of memory - used to determine how much space is needed to store the show information package; control date - used to determine which day the SIP contains data for; program category - used to indicate the categories, if any, of the programs inside the SIP; first letter in the program's title (FLPT) - used to indicate the first letter of the programs' title contained within the SIP.

Following the general data is specific data for each show that fits within the four-hour time block. For a given show, represented by block 314, the following fields are present in the show information package: multiple show flag field - used to determine if this show is the last show within the package, or if there are other shows following this show in the four hour block; start time field - contains an offset from the start time of the four-hour block, this offset is added to the time of the four-hour block to determine the start time of the show; duration field - specifies the air time for the show; program category - contains information on the type of show; for example, the show may be a sporting event, a news program, or a movie; program sub category - contains information on the type of show; for example, the show may be a dramatic (sub category) movie (a category); CC field determines whether or not the show is closed captioned; stereo field - determines whether or not the show is broadcast in stereo; add-ons field - is an extra field for expansion, this field may contain other information about the show (i.e. rating of the show) as that information becomes standard in the art. In alternative embodiments a variety of other information can be included for each show.

Following these fields are fields representing program title, primary description - a short description of the program, secondary description - a longer description of the program and VCR+ PLUSCODE. Each of these items are represented by two separate fields, one containing

the length of a specific item, such as title length, and one containing the item itself, such as title. The length fields are used to determine how many of the following bytes comprise the data item. For example if the secondary description length field is 40 bytes, the schedule system will know that the next forty bytes comprise the secondary description.

Following this information is an end-of-show field. The end-of-show field is used to indicate that the information for that particular show is finished. A show information package may contain information for one or more shows depending on how many shows are broadcast within the four hour block. The presence of multiple shows is represented by 315 and 316.

A show information package is structured so as to provide several unique features for storing data. The title length, primary description length, secondary description length and VCR+ PLUSCODE length fields can be expanded for values that are too large to fit within one byte. For example, referring to FIG. 3, if the secondary description length is greater than 255 (the maximum length value that can be stored within one byte), the length byte is set to 255 (the maximum value). Setting the length byte to the maximum value indicates that the following byte is also a length byte and the two bytes should be added to determine the length of the secondary description. In this way, a show information package can be used to dynamically allocate space to accommodate longer descriptions or longer titles.

The end-of-show field allows for the inclusion of data in the show information package that is not read by a current version of a schedule system but may be utilized by for later versions. As shown again in FIG. 2, following the VCR+ PLUSCODE field, there are two fields of unspecified data. This is data which may be read by future versions of a schedule system but is currently not processed. When processing show information package data, a schedule system will discard this data until it reads an end-of-show field. The schedule system will not begin processing data for a new show until an end-of-show field is found. This feature allows a schedule system to access the same data as a different schedule system which may incorporate other information besides title, description, etc.

Pre-established Time List

The pre-established time list is used to locate television program information for each channel in the schedule system. Television programming schedule data is located through the use of pointers which contain the addresses of show information packages stored in memory. Each pointer points to one show information package containing a four hour block of schedule data. The pre-established time list contains 42 pointers for each channel and therefore can reference 7 days of program schedule data. In alternate embodiments where schedule data is stored for more then seven days the pre-established time list would contain a correspondingly larger number of pointers.

FIG. 4 illustrates the pre-established time list. The pre-established time list, which is a grid of times and channels. A designated location in static area 300 is assigned to each telecast

time and channel. Specifically, four hour blocks of telecast time are designated by base letters A-AO and telecast channels are designated by subscripts 1-N -- contains a set of forty two pointers 313 for each channel in the schedule system. Each pointer corresponds to a show information package that contains data for a four hour block of television programming. For example, in FIG. 4. the pointer E1 corresponds to program data from four p.m. to eight p.m, on one channel. Twelve pointers represent 48 hours of programing information (24 hours for the current day and 24 hours for the next day).

Referring to FIG. 4, pointers A2 through AO2 are used to represent the program data associated with the second channel in the schedule system. Each pointer contains an address, in dynamic area 301, of a show information package of variable length containing actual television program data. When searching for specific television schedule data, the schedule system first looks in the pre-established time list to secure the appropriate pointer, then uses the address found in that pointer to determine where the data is stored. For example if data for the second channel in the schedule system is needed for a television program between eight p.m. and twelve midnight the schedule system will use the address in pointer F2 to determine the location in dynamic area 301 of the show information package containing the associated data.

In summary, the address of the show information package of a given television program is stored in static area 300 in a location assigned to the telecast time and channel of that program, e.g., the address of the show information package of a program to be telecast between eight p.m. and twelve midnight on the second channel is stored in location F2.

Channel Map

The database also contains a channel map located in static area 300. The channel map, depicted in FIG. 6, links the television programming provider channel number with the internal channel number. For example, in FIG. 6, channel 7 is assigned to internal channel 1 and channel 11 is assigned to internal channel 3. The channel map is used to identify the provider channel number when creating a program guide display.

Control Array

The database also contains a fixed control array located in static area 300. The control array is used by a schedule system to identify channels which have been inhibited for display by the user. The control array is depicted in FIG. 7. For each channel, a display field 320 is set to "1" if the channel is to be displayed and set to the "0" if the channel is to be inhibited. Referring to FIG. 7, channels 1, 2, 4, and 5 will be displayed in a program guide while channel 3 will be inhibited.

There is also a field for each channel for additional "add-on" information. This field allows for the addition of other user controlled functions in future versions of a schedule system such as a specified time period for inhibiting display of a channel.

Call Letter Map

The database also contains a call letter map located in static area 300. The call letter map links the call letters corresponding to a television provider with the internal guide channel. For example, in FIG. 8, the call letters KABC are linked to internal channel 1 and the letters WWOR are linked to internal channel 2. The call letter map is used to identify provider channel call letters for display in a program guide.

Record Queue

User requests for recording future programs are stored in the record queue. The record queue is a fixed length table of twenty entries located in static area 300. The record queue is depicted in FIG. 9.

Each entry in the queue contains the channel that the show will air on and the start time of the show. The record queue is structured so that programs are in time sequence order. That is, the first item in the list will be broadcast earlier than any of the other items, and so on. This structure eliminates the need to search the record queue in order to find the next program for recording.

Data Transmission

Television schedule data is continuously transmitted to the database from the vertical blanking interval (VBI) of the data provider channel. In order to receive schedule data the television must be tuned to the data provider channel. For example, if the data provider channel is channel 7, the television must first be tuned to channel 7 before schedule data can be received. The schedule system attempts to receive data from the provider channel four times a day.

Because a user may be watching a different channel when the schedule system attempts to download data, a download is attempted four times in an effort to ensure the database receives a complete set of data. The four download attempts are spaced six hours apart over a 24-hour period to provide a high probability that during one of those attempts a user will not have the television tuned to another channel. For example, download attempts may occur at twelve midnight, six a.m., twelve noon, and six p.m. It is unlikely that someone will be watching television at all four of these times.

In an alternate embodiment schedule data updates can occur on an individual basis for each channel. Each channel provider can supply schedule updates in the VBI signal for that channel. When the user selects a channel for display the schedule system can interrogate the VBI on that channel and receive schedule updates.

The entire dynamic area 301 is erased before the first download of the day. This complete erasure ensures that all data for shows that have already aired is removed from the schedule system. All television program data is sent and received in download packets. The download packet is comprised of the schedule information, along with a header which contains

routing data, enabling the schedule system to determine how to store the contents of the packet.

FIG. 10 illustrates a download packet. The packet begins with a packet header containing packet ID number 302 used to distinguish this packet from other packets. The packet header also contains number of bytes 303 and number of blocks 304. These values are used to determine the size of the packet.

The packet header is followed by the show information package (SIP) header. There is a show information package header for each show information package in the packet. The SIP header contains: guide number 305 which specifies the internal channel number of the data in the show information package; channel ID 306 which specifies the source of the data in the show information package; and time slot 307 used to designate the time of day of the data in the show information package. A show information package 308 follows the SIP header.

Upon receipt, a show information package is extracted from the download packet and temporarily stored in memory. The show information package contains a control date field that is used to determine which day and time the data is for, a guide channel field that specifies the internal channel number for the data and a program category that specifies which categories of programs are included within the package.

Before new show information packages are stored, a check is made to determine if the internal channel number in the show information package header corresponds to a channel which is enabled for display. If the internal channel does correspond to an enabled channel the control date is checked. If the SIP is outside of the seven-day system window, or for a channel not enabled, it is discarded.

Before new show information packages are stored, a check is made to determine if the SIP is beyond the two-day all program listing window and contains a program that corresponds to a predetermined category. If so, the SIP is rewritten to include only programs corresponding to predetermined categories prior to storage. This scheme is outlined in FIG. 19 and FIG. 20. All non-matching program category shows are discarded. If the show information package is outside of the current two-day window and does not contain program category information, the show information package is discarded.

All other SIPs must fall within the two-day all program listing window and are stored as follows: The SIPs are written into memory location 301. The pointers used in the pre-established time list data structure are updated to indicated where the corresponding SIP was stored.

The schedule system contains a memory prioritization scheme to efficiently use the memory space available. The scheme is outlined in FIG. 11. The prioritization scheme is keyed to the number of channels that are selected for display. If the operator has selected twenty-nine or less channels for display, all titles, first level descriptions and second level descriptions for programs that fall within the 2-day window are stored.

If the user has selected over 30 channels for display, but less than 39 channels, all shows that will air on the current day are stored with title, first level and second level descriptions. All shows broadcast for the second day, however, will only be stored with the title and the first level description. Program category shows will only be stored with their titles. If the operator has selected over 40 channels for display, only titles are stored.

Memory Management

The database includes a memory bit map in order to track the parts of dynamic area 301 that are currently holding program data as opposed to the parts of the program schedule memory that are free to store new program data. The memory bit map divides the memory into 32 byte blocks. Each block is represented by a bit in the memory bit map.

The memory bit map is depicted in FIG. 12. Each bit in the map 310 represents a 32 byte block of memory. A "1" in the bit position 311 indicates that program data is stored in that block. A "0" in the position 312 indicates that the block is free. When new data is to be stored, a search can be made through the memory bit map to locate a sufficient number of free positions in which to store the data. When the positions are located, the data is stored and the corresponding numbers in the memory bit map are changed from "0" to "1" to indicate that those memory locations are occupied.

For example, referencing FIG. 12, if data is received that requires ten blocks of storage, a schedule system will scan the memory map and store the data in the space represented by bits 0-7 in row 3 and bits 0-1 in row 4. These bits will then be set to "1" in the memory bit map.

A schedule system can also periodically re-order the memory so that free space is grouped contiguously. For example, referencing FIG. 12, the data starting in the block represented by bit 2 in row 0 and ending in the block represented by bit 1 in row 1 would be slid over to the block represented by bit 3 in row 0. This will remove the "0" gap in row zero. This process is repeated throughout the memory map so that all free space is grouped together at the end of memory.

As previously stated, all the information in dynamic area 301 is cleared out once a day. This process ensures that the database does not contain data which is more than one day old. A schedule system can also prune data to remove data for shows that have already aired. This pruning is accomplished by searching through show lists in dynamic area 301 to identify shows that have start times that have occurred before the current time. Data for any of these identified shows is removed from the database, and a garbage collection routine would secure the memory that contained these old shows by changing the appropriate bits in the memory bit map.

The schedule system may also remove data for channels which have been disabled. For example, if the operator disables a channel for display, the schedule system can delete any program schedule data for that channel. The garbage collection routine will then secure the memory space that was represented by shows for the deleted channel. If the operator were to

select the channel for display again the schedule system would have no data for that channel until the next update period.

Database Processing

In addition to traditional database processing using common retrieve and parse functions, the schedule system also facilitates faster searching for certain types of searches by the use of indexing bits placed in the header of the SIP package. In the present embodiment, qualifying fields of bits exist for program category (2 bytes), program sub category (2 bytes), and the first letter in a program's title (26 bits - one bit per letter) as shown in FIG. 2. For example, FIG. 5 shows the header of a SIP package that contains a program category "MOVIE", sub category "ACTION", titled "ZORRO". For this SIP the bit mapped to "MOVIE" 500 within the program category field is set to "1", the bit mapped to "ACTION" 501 within the sub program category field is set to "1", and the bit mapped to "Z" within the FLPT is set to "1".

SIPs that contain multiple programs have bits properly set for all the programs in the SIP, using a logic "OR" function. For example, if a SIP contained three programs, ZORRO, Magnum PI and Monty Python, the first letter of the program bits for "Z" and "M" are set to "1", all other bits are "0".

When performing searches involving a bit field the schedule system first checks that the corresponding bit in the SIP's header matches the search criteria. If the criterion is met the system then parses the data from the SIP, if the criteria is not met the system skips that SIP altogether. This method significantly reduces search times by limiting the number of SIPs that must be parsed.

Interaction between the database and a television program schedule system is illustrated through the following examples:

1. The user requests a time specific program guide (TISPG), the current time is 7 p.m.

When the user requests a TISPG for information pertaining to television shows that are currently being broadcast, the schedule system first reads the current time (7 p.m.) from a microprocessor clock. The schedule system then determines the pointers that correspond to current time in the pre-established time list, FIG. 4. Since the current time is 7 p.m. the schedule system will look to the fifth pointer (this pointer corresponds to the data from 4 p.m. to 8 p.m.) for each channel: Channel 1 - El, Channel 2 - E2, Channel 3 - E3, . . ., Channel N - EN.

For each pointer the schedule system accesses the associated show information package, FIG. 2. The schedule system adds the start time of the four hour block (4 p.m.) to the time offset in each show in the show information package to determine the show that is currently airing on that channel. Information for the show is then extracted from the show information package. The extracted information includes title, primary description, secondary description and VCR+ PLUSCODE.

Internal channel numbers are also used to index into the channel map, FIG. 6. Specifically, the channel number is used to select a specific source channel ID for display in the guide: Channel 1 - 7, Channel 2 - 6, Channel 3 - 11, . . . Channel n - 172. The internal channel number is also used to index into the call letter map, FIG. 7. Specifically, the internal channel number is used to pull out the station identification call letters for display in the guide: Channel 1 - KABC, Channel 2 -WWOR, . . . Channel 3 - KTVR. All of the information from the show information package, the channel map and the call letter map is used to create formatted text lines for display in a guide.

2. The user requests a channel specific program guide (CSPG), the current channel being viewed is channel 6, the current time is 3 p.m.

When the user requests a CSPG for information pertaining to television shows that are airing or will be broadcast on a specific channel (e.g., channel 6) at a specific time (e.g., 3 p.m.) the schedule system determines the channel number corresponding to the displayed channel by interrogating a system variable. For this example the channel is channel 2. The schedule system then reads the current time (3 p.m.) from a microprocessor clock. The schedule system determines the pointer that corresponds to current time for the selected internal channel in the pre-established time list, FIG. 4. Since the current time is 3 p.m. and the selected internal channel is channel 1 the schedule system will look to the fourth pointer (this pointer corresponds to the data from 12 noon to 4 p.m.) in the second set of pointers. This pointer is D2, FIG. 4.

The schedule system then accesses the associated show information package, FIG. 2, for pointer D2. The schedule system adds the start time of the four hour block (12 noon) to the time offset in each show in the show information package to determine the show that is currently airing. Information for the show is then extracted from the show information package. The extracted information includes title, primary description, secondary description and VCR+ PLUSCODE. The schedule system extracts data for all shows in the show information package pointed to by D2 that occur after the selected show. Information is then extracted for all shows in show information packages pointed to by pointers E2 - L2.

The internal channel number is also used to index into the channel map, FIG. 6. Specifically, the internal channel number is used to pull out the specific source channel ID, channel 6, for display in the guide. The internal channel number is also used to index into the call letter map, FIG. 7. Specifically, the internal channel number is used to pull out the station identification call letters, WWOR, for display in the guide. All of the information from the show information package, the channel map and the call letter map is used to create formatted text lines for display in the guide.

3. The user requests a program category guide (PCG), the selected category is "MOVIE", the current time is 10:30 a.m.

When the user requests a PCG for information pertaining to television shows within a specific category (MOVIE) that are airing or will be broadcast, the schedule system first reads the current time (10:30 a.m.) from a microprocessor clock. The schedule system then determines the pointers that correspond to current time in the pre-established time list, FIG. 4. Since the current time is 10:30 a.m. the schedule system will look to the third pointer (this pointer corresponds to the data from 8 a.m. to 12 noon) for each channel: Channel 1 - Cl, Channel 2 - C2, Channel 3 - C3, . . . , Channel N - CN.

For each pointer the schedule system accesses the associated show information package, FIG. 2. The schedule system checks the category bit in each SIP header to determine if a category (MOVIE) is contained in the SIP. If a "MOVIE" is contained in the SIP the schedule system adds the start time of the four hour block (8 a.m.) to the time offset in each show in the show information package to determine the show that is currently airing on that channel. If the current show is a "MOVIE", information for the show is extracted from the show information package. The extracted information includes title, primary description, secondary description and VCR+ PLUSCODE.

The schedule system then increments the current time by five minutes (10:35) and repeats the above process on the SIP package. The clock is incremented again by five minutes and the process is repeated until the clock time is at the end of the four hour block, i.e. 12 noon. The schedule system then access all remaining pointers in like manner, D1 - DN, E1 - EN, . . . AO1 -AON and extracts information for all shows that contain the category "MOVIE".

4. The operator requests a title guide (TG), of all the program titles that begin with the letter "Z", the current time is 10:30 a.m.

When the user requests a TG for information pertaining to television shows that begin with a specific letter that are airing or will be broadcast, the schedule system first reads the current time (10:30 a.m.) from a microprocessor clock. The schedule system then determines the pointers that correspond to current time in the pre-established time list, FIG. 4. Since the current time is 10:30 a.m. the schedule system will look to the third pointer (this pointer corresponds to the data from 8 a.m. to 12 noon) for each channel: Channel 1 - Cl, Channel 2 - C2, Channel 3 - C3, . . . , Channel N - CN.

For each pointer the schedule system accesses the associated show information package, FIG. 2. The schedule system checks the bit corresponding to the first letter in a program's title (FLPT) in the SIP header to determine if there is a match. If a show contains a "Z" the schedule system adds the start time of the four hour block (8 a.m.) to the time offset in each show in the show information package to determine the show that is currently airing on that channel. If the current show begins with a "Z", information for the show is extracted from the show information package. The extracted information includes title, primary description, secondary description and VCR+ PLUSCODE.

The schedule system then increments the current time by five minutes (10:35) and repeats the above process on the SIP package. The clock is incremented again by five minutes and the process is repeated until the clock time is at the end of the four hour block, i.e. 12 noon. The schedule system then access all remaining pointers in like manner, D1 - DN, E1 - EN, . . . AO1 -AON and extracts information for all shows that contain the category "MOVIE".

5. The user requests a "when else" (WE) display of a selected program, ZORRO (ie when else is ZORRO airing?), the current time is 10:30 a.m.

When the user requests WE information pertaining to a selected television show the schedule system first reads the current time (10:30 a.m.) from a microprocessor clock. The schedule system then determines the pointers that correspond to current time in the pre-established time list, FIG. 4. Since the current time is 10:30 a.m. the schedule system will look to the third pointer (this pointer corresponds to the data from 8 a.m. to 12 noon) for each channel: Channel 1 - Cl, Channel 2 - C2, Channel 3 - C3, . . . , Channel N - CN.

For each pointer the schedule system accesses the associated show information package, FIG. 2. The schedule system compares the FLPT bit from the selected program with that of the SIP header to determine if there is a match. If there is a match the schedule system reads the data from the SIP and compares the show titles with the selected show.

The clock is incremented by five minutes and the process is repeated until the clock time is at the end of the four hour block, i.e. 12 noon. The schedule system then access all remaining pointers in like manner, D1 - DN, E1 - EN, . . . AO1 -AON and displays all matches, including the show's channel number and the day and time of airing.

Inhibiting Channels

The control array , FIG. 7, provides the capability to block channels for display. Blocking a channel inhibits the channel from being displayed on a schedule system, therefore the channel would not be part of the TISPG, CSPG, or CG.

When the user selects a channel for non-display, the display flag in the control array is set to "0". Whenever the schedule system user requests a program guide display, the schedule system first checks the control array before proceeding with processing on the pre-established time list. If the control array for a specific channel is set to "0" no other processing is performed for that channel and the schedule system goes on with the next channel. If the user were to re-select that channel for display in subsequent processing, the schedule system would enact the change the next time a program guide was created.

The control array may also be used to inhibit the storing of data for selected channels. For example, a television program schedule system could first check the control array before storing data for a specific channel. If the control array for a specific channel contained a "0" no data

corresponding to that channel would be stored. Note that a channel may be inhibited for display as described above without necessarily blocking the storage of data.

Recording

When the user selects a program for recording the schedule system stores the channel number of the selected program and the program start time in the record queue, FIG. 9. The program start time is computed by adding the offset contained in the show information package to the start time of the associated four hour block of data.

The record queue is put in time order whenever a new entry is added. This ordering facilitates periodic polling of the start time in the first show of the queue to determine the next recording command to be executed. The address of the queue is easily accessible as it is stored in static area 300. After a show is recorded the next show in the queue is moved to the beginning of the queue.

WHAT IS CLAIMED IS:

1. A method for displaying television program information comprising the steps of:

storing in electronic memory electronic program guide information including for each television program, title, start time, and regional channel name;

storing in electronic memory a channel map that links channel names with local channel numbers;

selecting a particular on-screen guide for display;

retrieving from electronic memory electronic program guide (EPG) information required to display the selected on-screen guide, including title, start time, and regional channel name;

retrieving from electronic memory the local channel number linked to each regional channel name retrieved from electronic memory;

displaying the retrieved titles, start times, regional channel names, and the local channel numbers as the selected on-screen guide.

2. The method of claim 1, additionally comprising the step of transmitting the EPG information in the VBI of a telecast signal telecast throughout the region, the step of storing EPG information comprising downloading from the VBI the transmitted EPG information of the telecast signal.

3. The method of claim 2, additionally comprising the step of transmitting channel maps for a plurality of geographic areas in the VBI of the telecast signal , the step of storing a channel map that links channel names with local channel numbers comprising downloading from the VBI the channel map applicable where the displaying step us performed.

FIG. 1

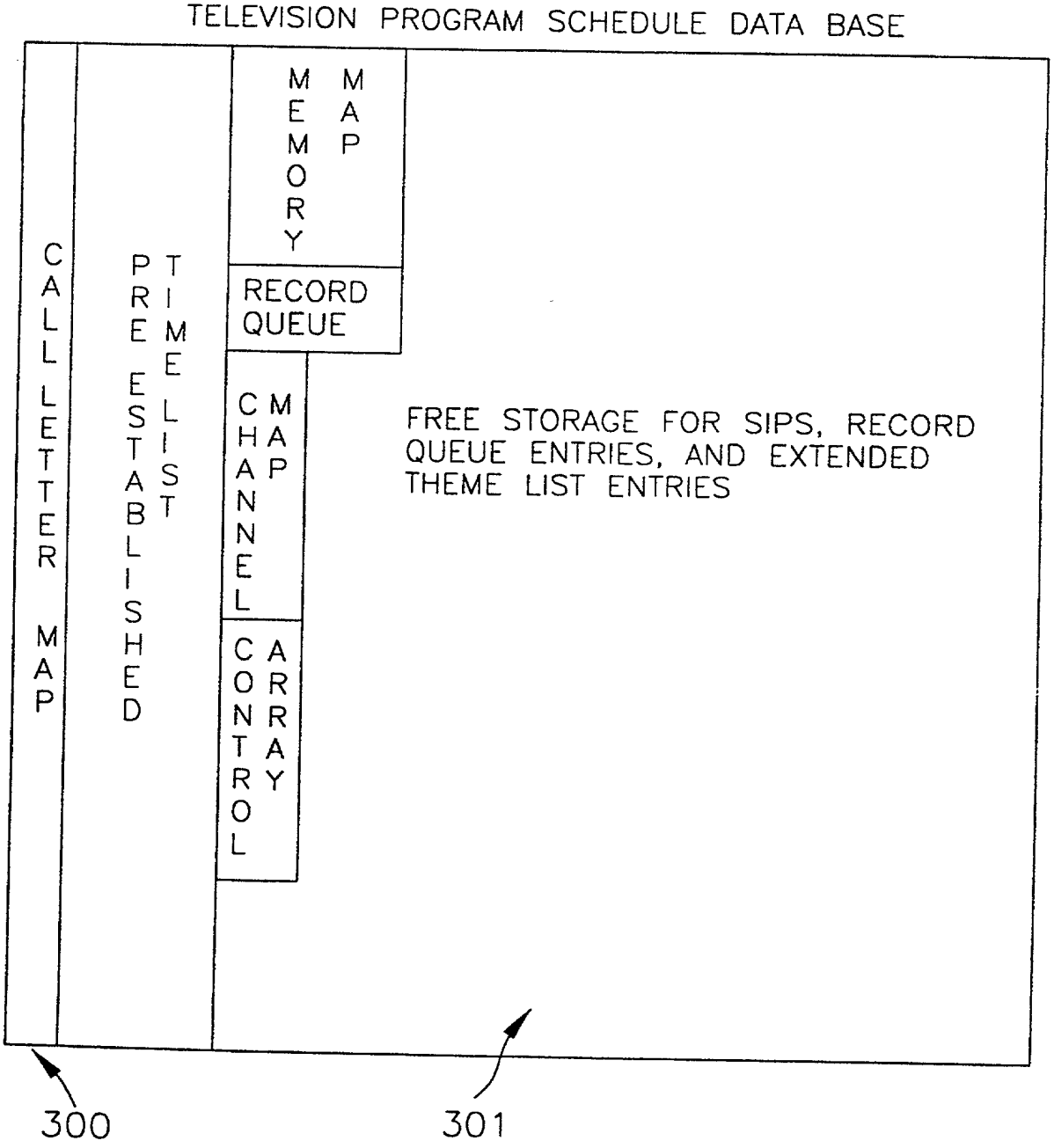

TELEVISION PROGRAM SCHEDULE DATA BASE
CALL LETTER MAP
PRE ESTABLISHED TIME LIST
MEMORY MAP
RECORD QUEUE
CHANNEL MAP
CONTROL ARRAY
FREE STORAGE FOR SIPS, RECORD QUEUE ENTRIES, AND EXTENDED THEME LIST ENTRIES
300
301

FIG. 2

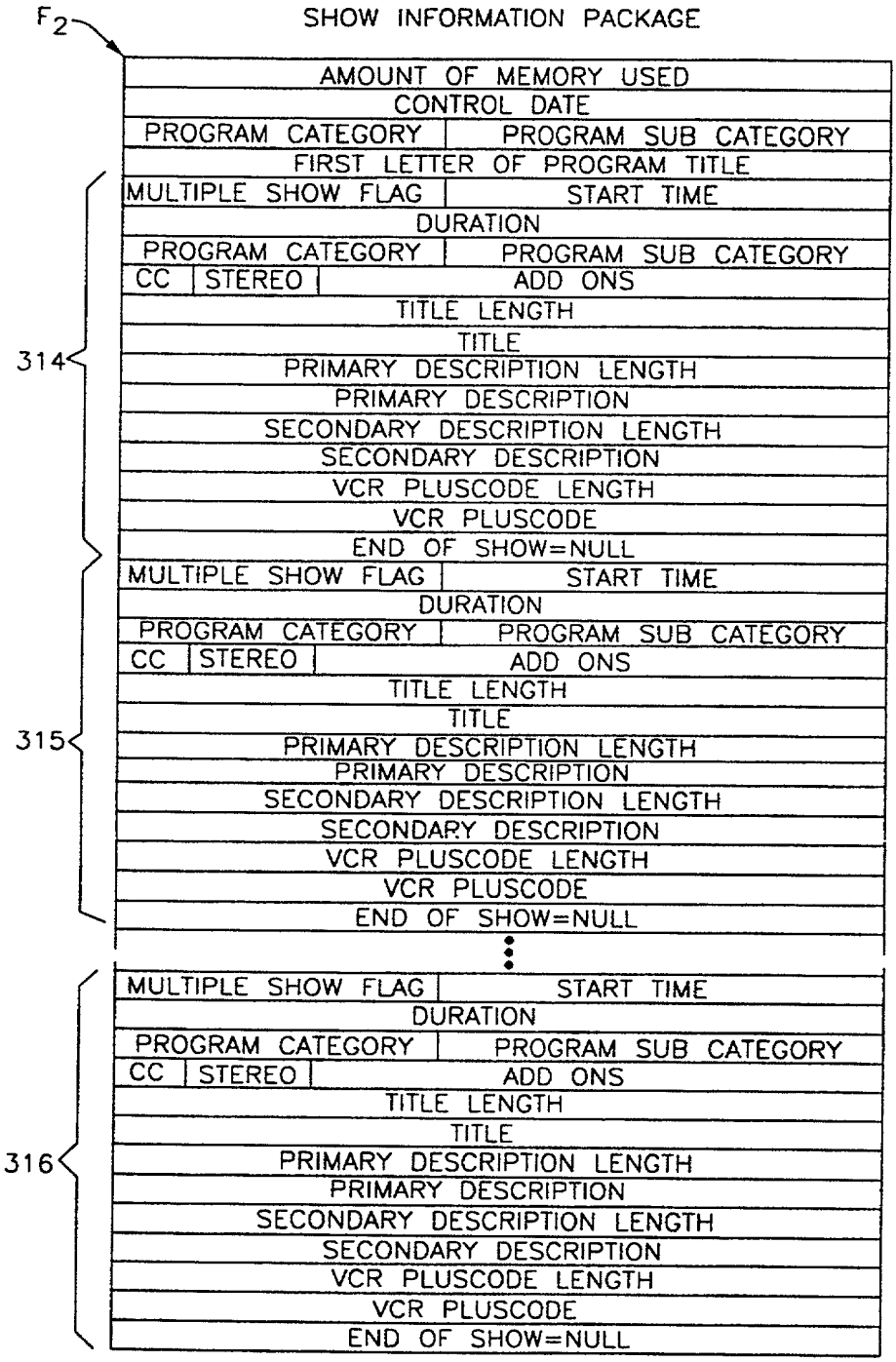
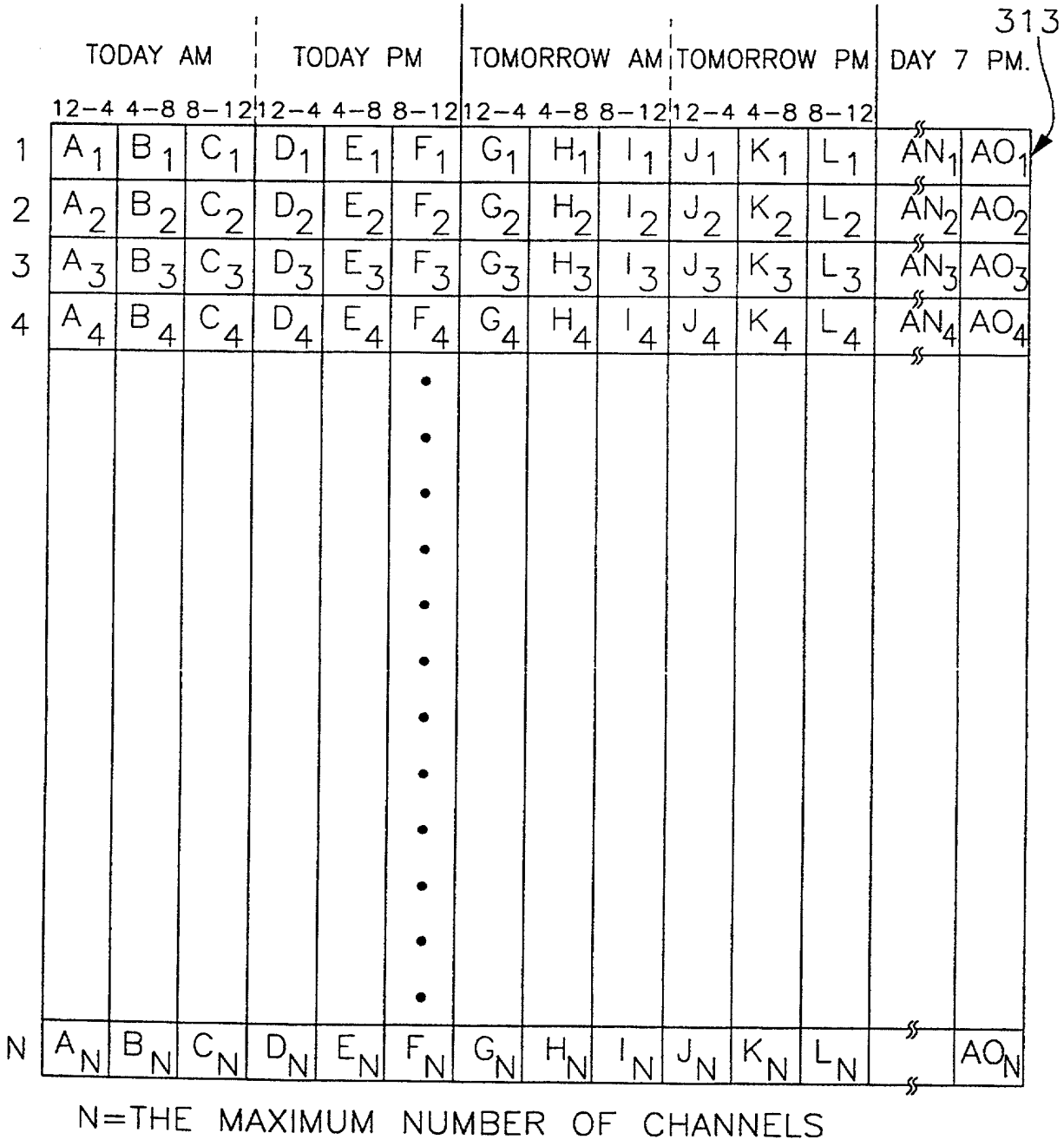

F2
SHOW INFORMATION PACKAGE
AMOUNT OF MEMORY USED
CONTROL DATE
PROGRAM CATEGORY
PROGRAM SUB CATEGORY
FIRST LETTER OF PROGRAM TITLE
MULTIPLE SHOW FLAG
START TIME
DURATION
PROGRAM CATEGORY
PROGRAM SUB CATEGORY
CC
STEREO
ADD ONS
TITLE LENGTH
TITLE
PRIMARY DESCRIPTION LENGTH
PRIMARY DESCRIPTION
SECONDARY DESCRIPTION LENGTH
SECONDARY DESCRIPTION
VCR PLUSCODE LENGTH
VCR PLUSCODE
END OF SHOW=NULL
314
315
316

FIG.3

SHOW INFORMATION PACKAGE FEATURES

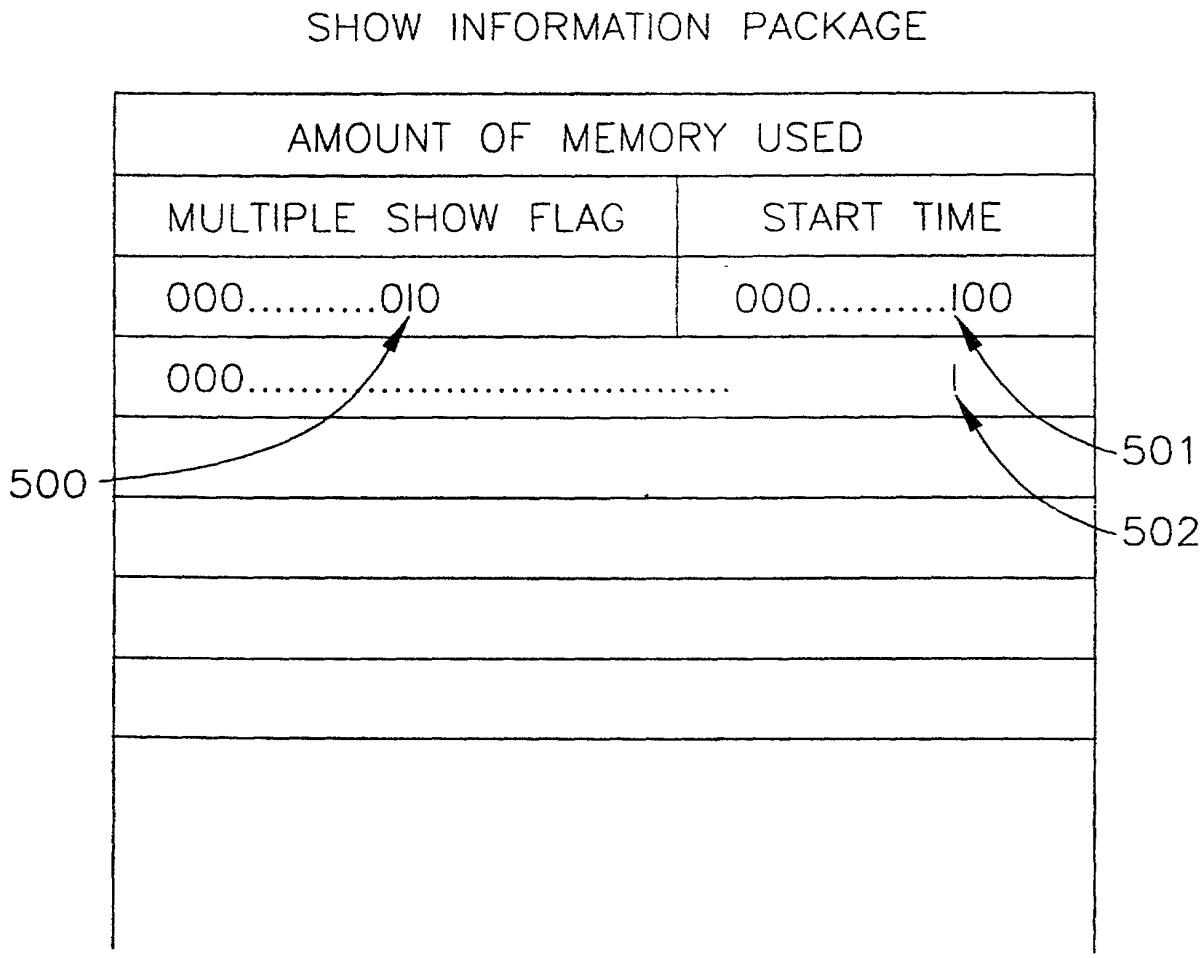
SECONDARY DESCRIPTION LENGTH=255
SECONDARY DESCRIPTION LENGTH
SECONDARY DESCRIPTION
VCR PLUSCODE LENGTH
VCR PLUSCODE
EXTRA DATA LENGTH
EXTRA DATA
END OF SHOW=NULL

FIG. 4



N=THE MAXIMUM NUMBER OF CHANNELS

FIG.5


SHOW INFORMATION PACKAGE
AMOUNT OF MEMORY USED
MULTIPLE SHOW FLAG
START TIME
000.....010
000.....100
000.....
500
501
502

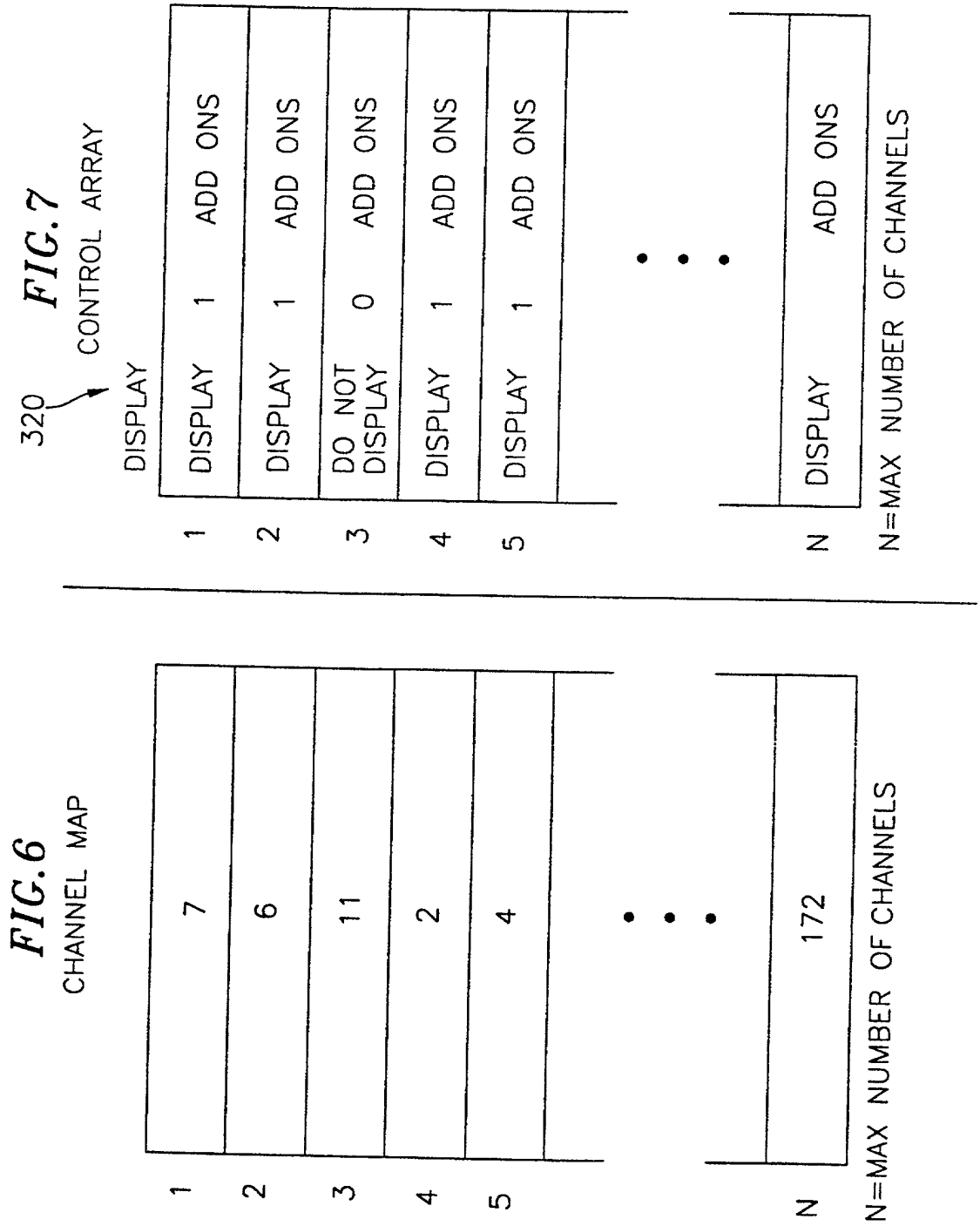


FIG. 6
CHANNEL MAP
1
2
3
4
5
7
6
11
2
4
N
172
N=MAX NUMBER OF CHANNELS
FIG. 7
CONTROL ARRAY
320
DISPLAY
1
2
3
4
5
DISPLAY 1 ADD ONS
DISPLAY 1 ADD ONS
DO NOT DISPLAY 0 ADD ONS
DISPLAY 1 ADD ONS
DISPLAY 1 ADD ONS
N
DISPLAY ADD ONS
N=MAX NUMBER OF CHANNELS

FIG.8

CALL LETTER MAP

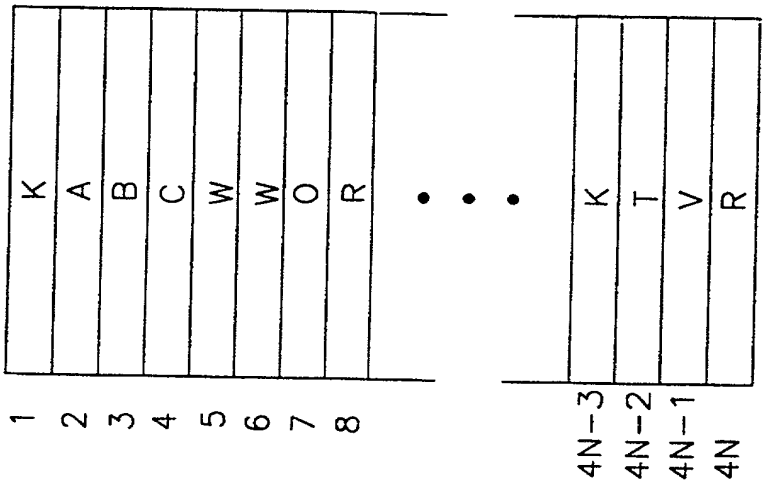


FIG.9

RECORD QUEUE

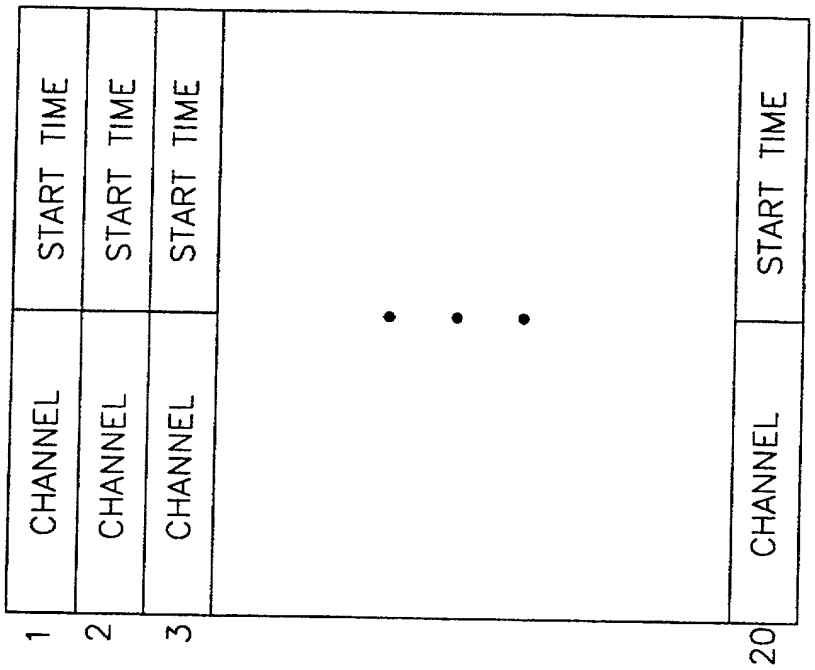
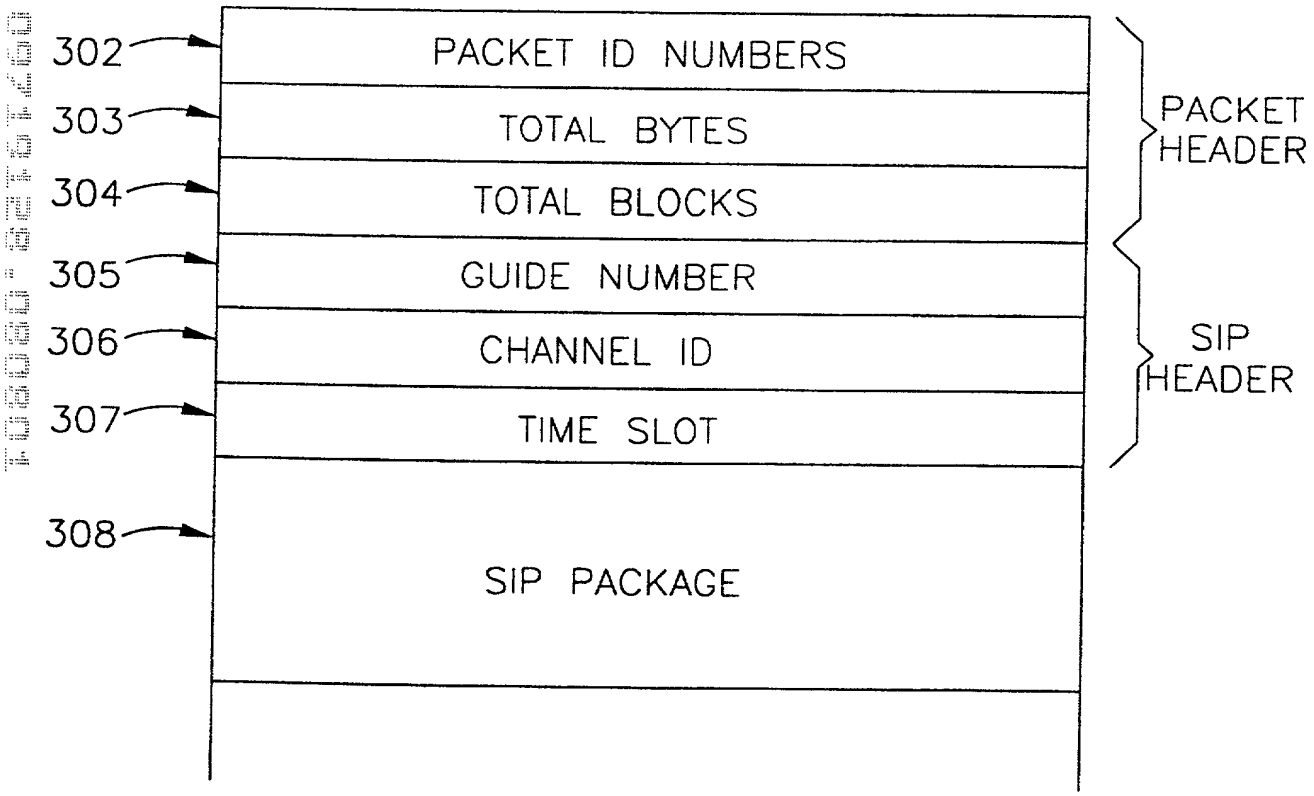


FIG. 10


302
PACKET ID NUMBERS
303
TOTAL BYTES
304
TOTAL BLOCKS
305
GUIDE NUMBER
306
CHANNEL ID
307
TIME SLOT
308
SIP PACKAGE
PACKET HEADER
SIP HEADER

FD8080 827F760

FIG. 11

MEMORY PRIORITIZATION

NUMBER OF CHANNELS	TODAY	TOMORROW	PROGRAM CATEGORY SHOWS
1-29	ALL TITLES ALL FIRST LEVEL DESCRIPTIONS ALL SECOND LEVEL DESCRIPTIPONS	ALL TITLES ALL FIRST LEVEL DESCRIPTIONS ALL SECOND LEVEL DESCRIPTIPONS	ALL TITLES ALL FIRST LEVEL DESCRIPTIONS ALL SECOND LEVEL DESCRIPTIPONS
30-39	ALL TITLES ALL FIRST LEVEL DESCRIPTIONS ALL SECOND LEVEL DESCRIPTIPONS	ALL TITLES ALL FIRST LEVEL DESCRIPTIONS	ALL TITLES
40 OR MORE	ALL TITLES	ALL TITLES	ALL TITLES

FIG. 12

MEMORY BIT MAP

	7	6	5	4	3	2	1	0
0	1	1	1	1	0	1	1	1
1	1	0	0	1	1	1	0	1
2	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	0	0
4	1	1	1	1	1	1	0	0
5	1	1	1	1	0	0	1	1
6	1	0	1	1	1	1	1	1
7	1	1	0	0	0	0	0	1
8	1	0	0	1	1	1	1	0
9	0	1	1	1	1	1	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	1	1	1	1	1	1	0	1
14	1	1	1	1	1	1	1	1
15	1	1	1	0	1	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	1	1	0	1

310

311

312

FOR OFFICIAL USE ONLY

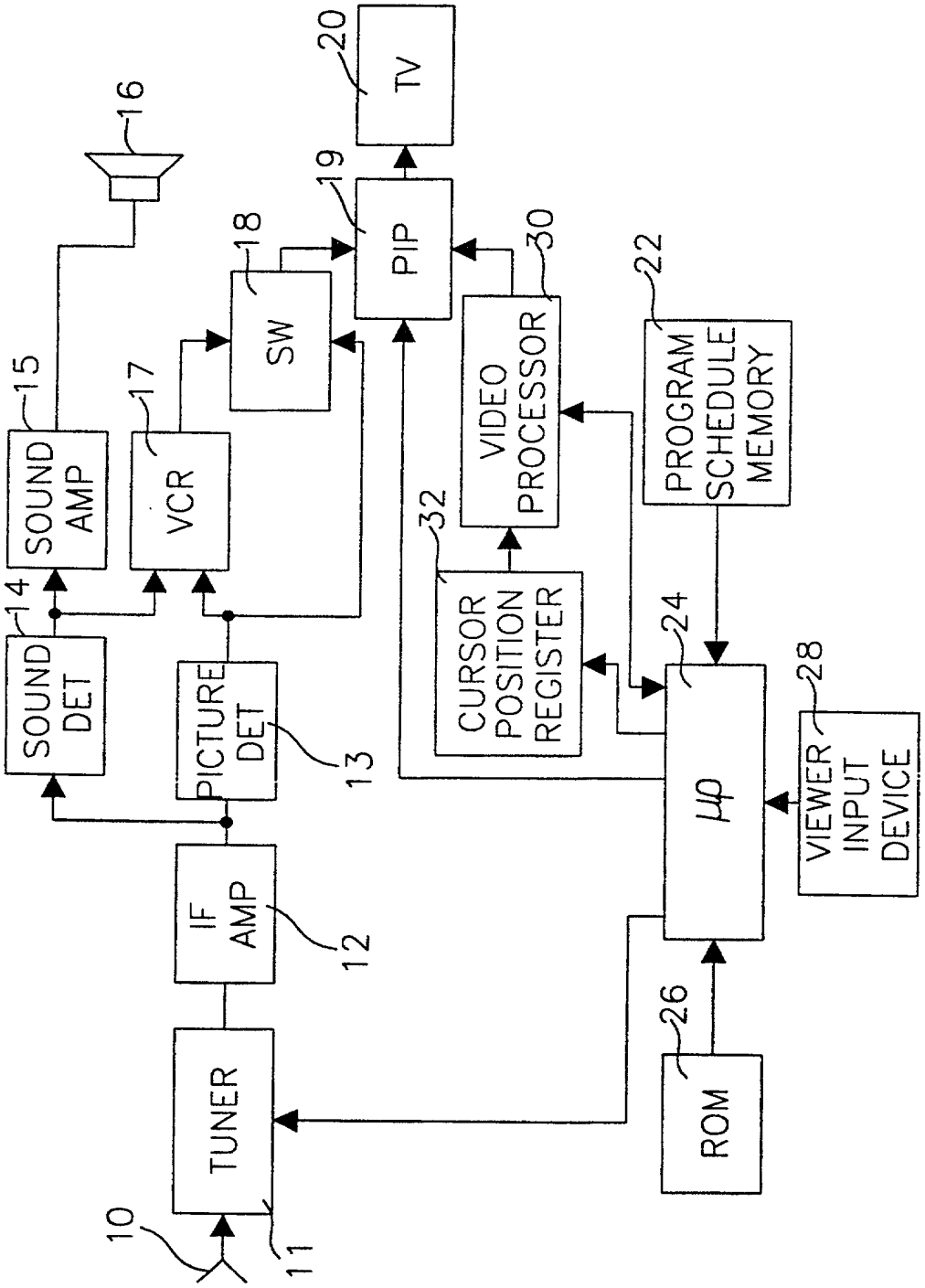

10
11
TUNER
IF AMP
12
PICTURE DET
13
SOUND DET
14
SOUND AMP
15
16
VCR
17
SW
18
PIP
19
TV
20
VIDEO PROCESSOR
30
CURSOR POSITION REGISTER
32
PROGRAM SCHEDULE MEMORY
22
μp
24
ROM
26
VIEWER INPUT DEVICE
28

FIG. 13

FIG. 14

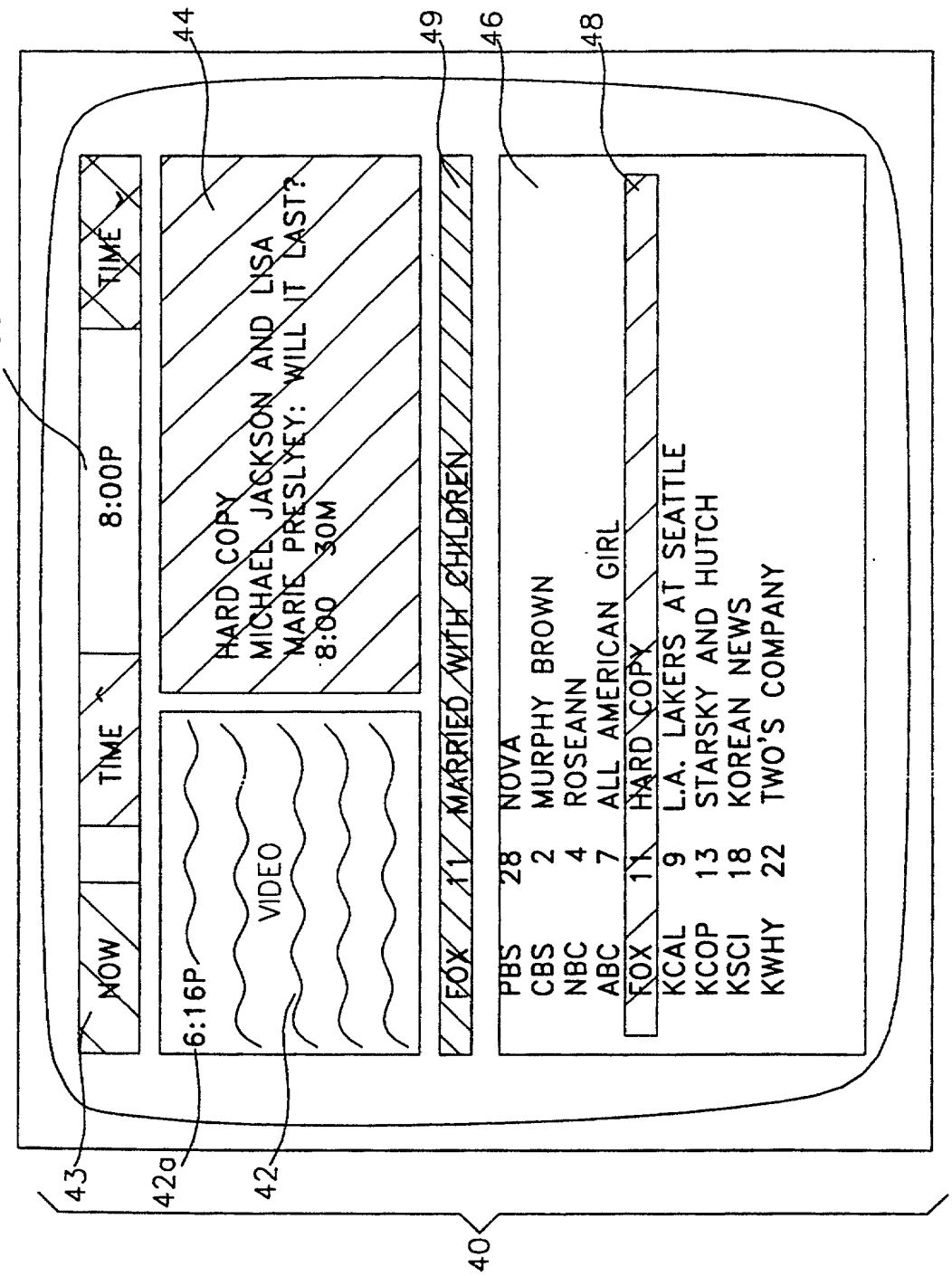

40
43
42a
42
43a
44
49
46
48
NOW
TIME
8:00P
TIME
6:16P
VIDEO
HARD COPY
MICHAEL JACKSON AND LISA
MARIE PRESLYEY: WILL IT LAST?
8:00 30M
FOX 11 MARRIED WITH CHILDREN
PBS 28 NOVA
CBS 2 MURPHY BROWN
NBC 4 ROSEANN
ABC 7 ALL AMERICAN GIRL
FOX 11 HARD COPY
KCAL 9 L.A. LAKERS AT SEATTLE
KCOP 13 STARSKY AND HUTCH
KSCI 18 KOREAN NEWS
KWHY 22 TWO'S COMPANY

FIG. 15

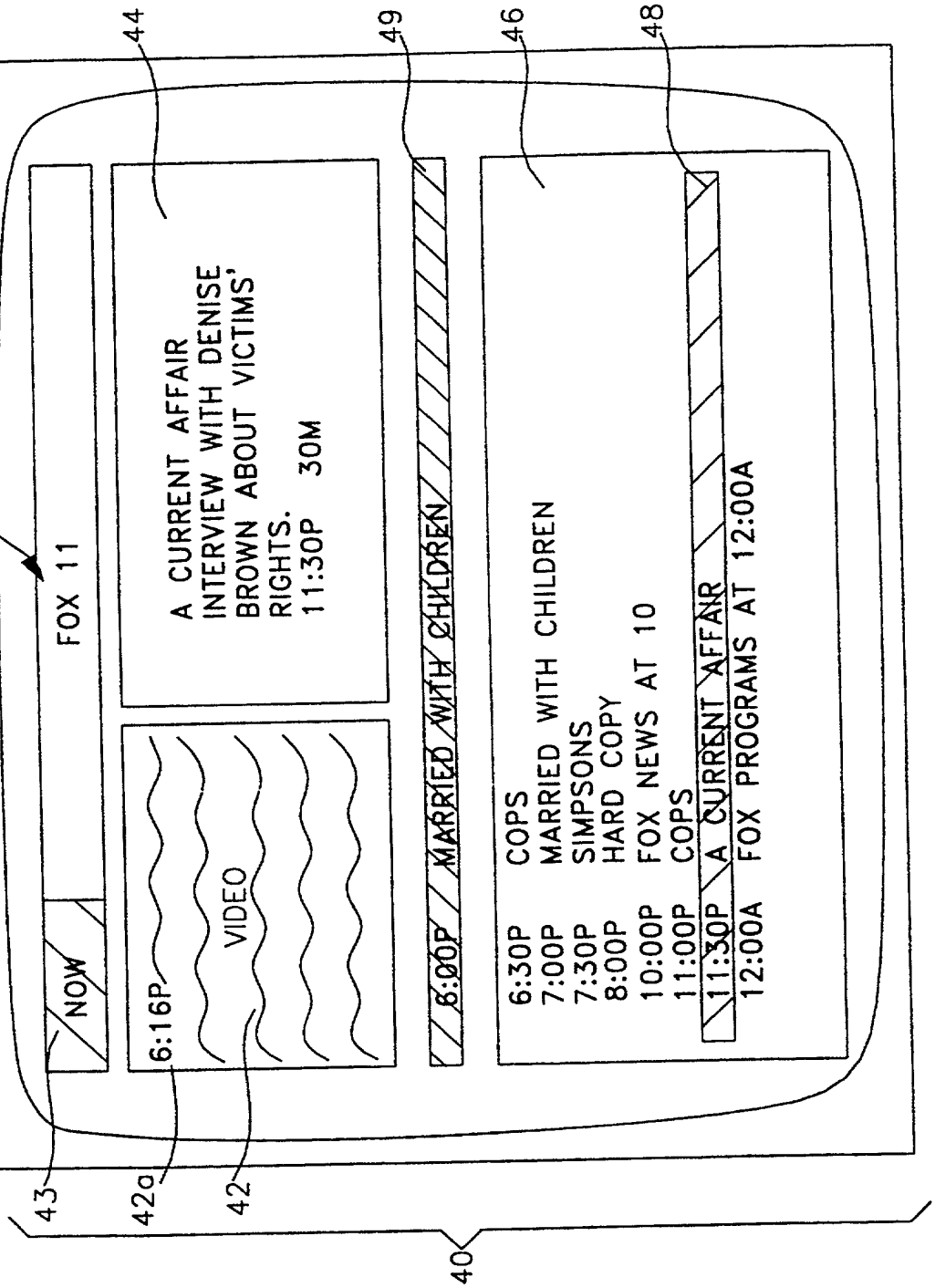

43
44
49
46
48
FOX 11
NOW
6:16P
VIDEO
A CURRENT AFFAIR
INTERVIEW WITH DENISE
BROWN ABOUT VICTIMS'
RIGHTS.
11:30P 30M
8:00P MARRIED WITH CHILDREN
6:30P COPS
7:00P MARRIED WITH CHILDREN
7:30P SIMPSONS
8:00P HARD COPY
10:00P FOX NEWS AT 10
11:00P COPS
11:30P A CURRENT AFFAIR
12:00A FOX PROGRAMS AT 12:00A
43
42a
42
40

FIG. 16

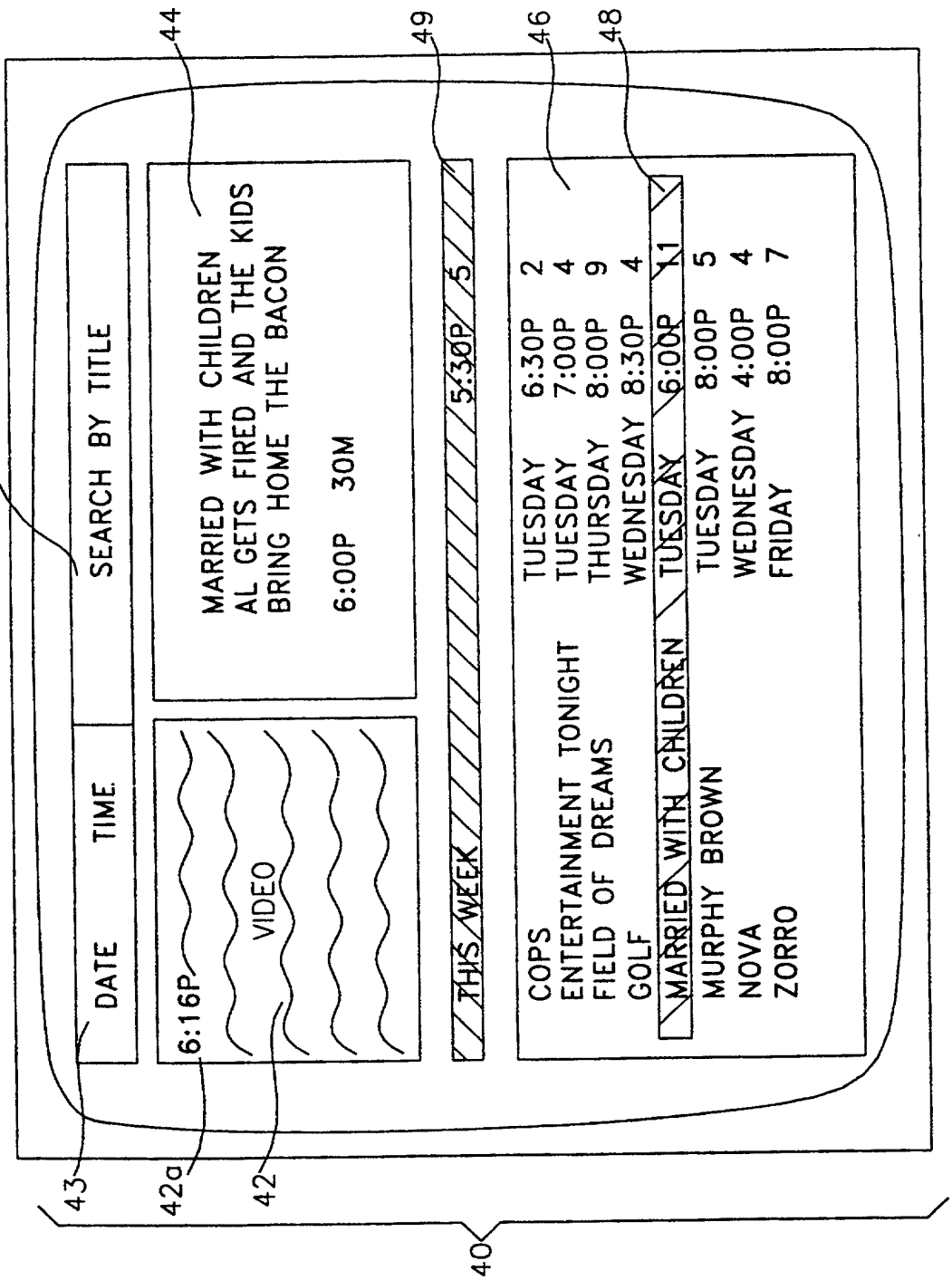

43
44
49
46
48
DATE
TIME
SEARCH BY TITLE
MARRIED WITH CHILDREN
AL GETS FIRED AND THE KIDS
BRING HOME THE BACON
6:00P 30M
6:16P
VIDEO
THIS WEEK
5:30P 5
COPS TUESDAY 6:30P 2
ENTERTAINMENT TONIGHT TUESDAY 7:00P 4
FIELD OF DREAMS THURSDAY 8:00P 9
GOLF WEDNESDAY 8:30P 4
MARRIED WITH CHILDREN TUESDAY 6:00P 11
MURPHY BROWN TUESDAY 8:00P 5
NOVA WEDNESDAY 4:00P 4
ZORRO FRIDAY 8:00P 7
43
42a
42
40

FIG. 17

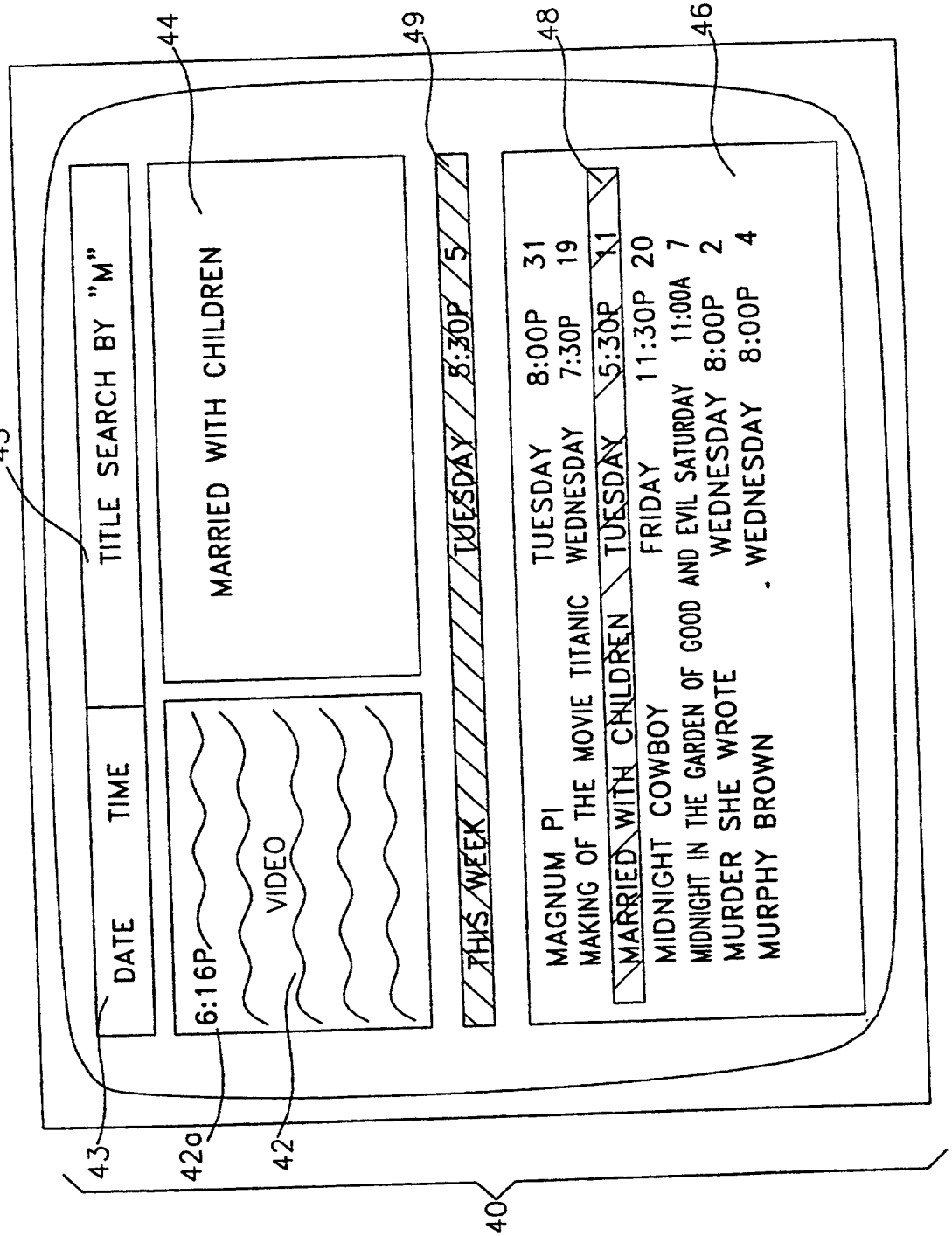

43
TITLE SEARCH BY "M"
44
MARRIED WITH CHILDREN
49
TUESDAY 8:30P 5
48
46
DATE TIME
6:16P
VIDEO
THIS WEEK
MAGNUM PI TUESDAY 8:00P 31
MAKING OF THE MOVIE TITANIC WEDNESDAY 7:30P 19
MARRIED WITH CHILDREN TUESDAY 5:30P 11
MIDNIGHT COWBOY FRIDAY 11:30P 20
MIDNIGHT IN THE GARDEN OF GOOD AND EVIL SATURDAY 11:00A 7
MURDER SHE WROTE WEDNESDAY 8:00P 2
MURPHY BROWN WEDNESDAY 8:00P 4
43
42a
42
40

FIG. 18

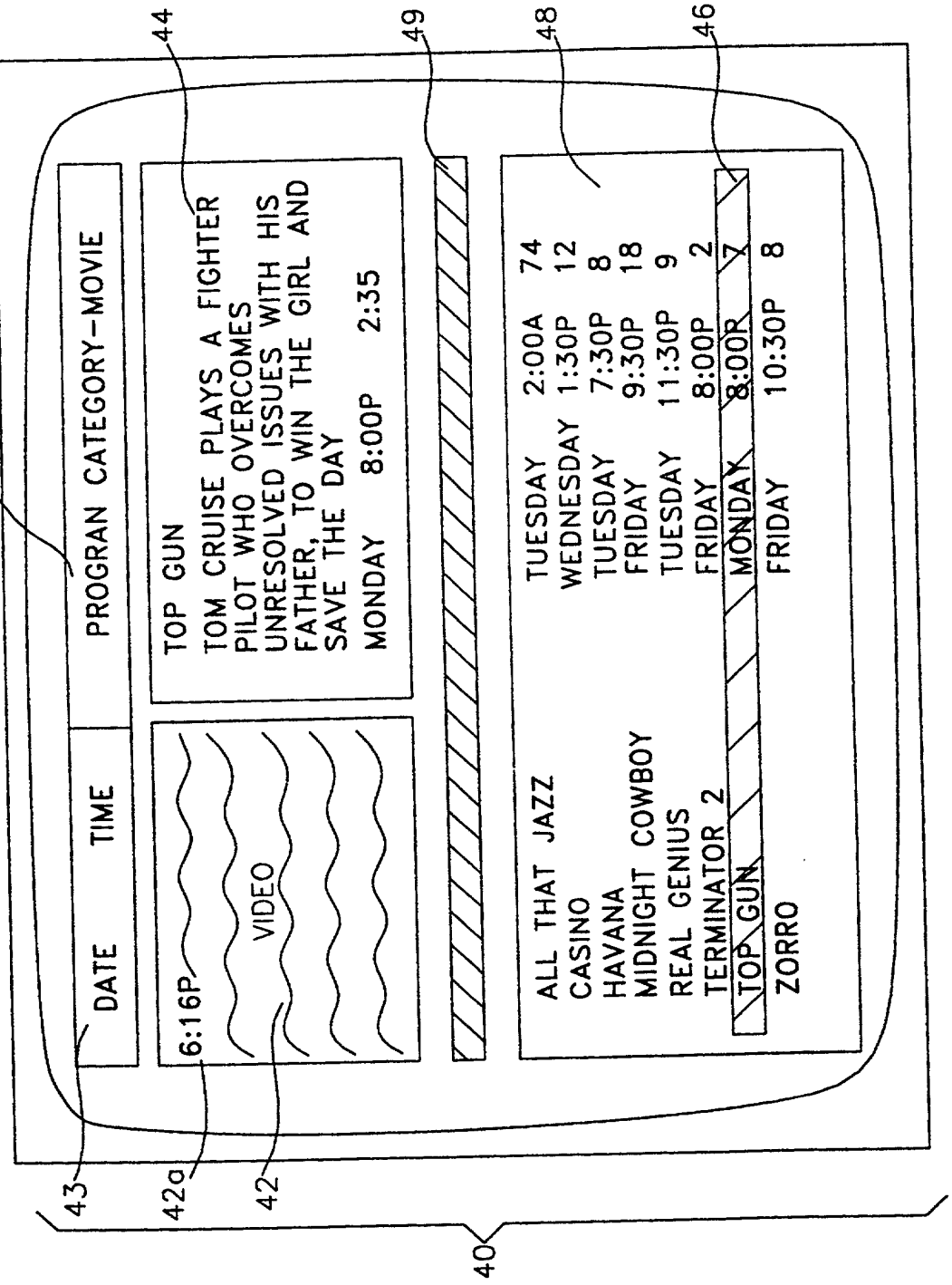

43
PROGRAN CATEGORY–MOVIE
DATE
TIME
44
TOP GUN
TOM CRUISE PLAYS A FIGHTER PILOT WHO OVERCOMES UNRESOLVED ISSUES WITH HIS FATHER, TO WIN THE GIRL AND SAVE THE DAY
MONDAY 8:00P 2:35
49
48
46
6:16P
VIDEO
ALL THAT JAZZ TUESDAY 2:00A 74
CASINO WEDNESDAY 1:30P 12
HAVANA TUESDAY 7:30P 8
MIDNIGHT COWBOY FRIDAY 9:30P 18
REAL GENIUS TUESDAY 11:30P 9
TERMINATOR 2 FRIDAY 8:00P 2
TOP GUN MONDAY 8:00R 7
ZORRO FRIDAY 10:30P 8
43
42a
42
40

FIG.19

TRANSMITTED SIP

HEADER
NEWS (AIRS TODAY)
MOVIE (AIRS 5 DAYS FROM TODAY)
SIT COM (AIRS 4 DAYS FROM TODAY)

FIG.20

STORED SIP

HEADER
NEWS (AIRS TODAY)
MOVIE (AIRS 5 DAYS FROM TODAY)

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS PATENT

Docket No. : 34758/WWM/I148

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled DATABASE FOR USE IN METHOD AND APPARATUS FOR DISPLAYING TELEVISION PROGRAMS AND RELATED TEXT, the specification of which is attached hereto unless the following is checked:

X was filed on June 9, 1999 as PCT International Application Number PCT/US99/13065

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of the foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Application Number	Country	Filing Date (day/month/year)	Priority Claimed

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

Application Number	Filing Date
60/088,671	June 9, 1998

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

Application Number	Filing Date	Patented/Pending/Abandoned

POWER OF ATTORNEY: I hereby appoint the following attorneys and agents of the law firm CHRISTIE, PARKER & HALE, LLP to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application;

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

Docket No. 34758/WWM/I148

or from the first or sole inventor named below in the event the application is not assigned; or from __ in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

R. W. Johnston	(17,968)	Gregory S. Lampert	(35,581)	Marc A. Karish	(44,816)
D. Bruce Prout	(20,958)	Grant T. Langton	(39,739)	John F. O'Rourke	(38,985)
Hayden A. Carney	(22,653)	Constantine Marantidis	(39,759)	Richard J. Paciulan	(28,248)
Richard J. Ward, Jr.	(24,187)	Daniel R. Kimbell	(34,849)	Josephine E. Chang	(46,083)
Russell R. Palmer, Jr.	(22,994)	Craig A. Gelfound	(41,032)	Frank L. Cire	(42,419)
LeRoy T. Rahn	(20,356)	Syed A. Hasan	(41,057)	Harold E. Wurst	(22,183)
Richard D. Seibel	(22,134)	Kathleen M. Olster	(42,052)	Robert A. Green	(28,301)
Walter G. Maxwell	(25,355)	Daniel M. Cavanagh	(41,661)	Derrick W. Reed	(40,138)
William P. Christie	(29,371)	Molly A. Holman	(40,022)	John W. Peck	(44,284)
David A. Difiard	(30,831)	Joel A. Kauth	(41,886)	Stephen D. Burbach	(40,285)
Thomas J. Daly	(32,213)	Patrick Y. Ikehara	(42,681)	David B. Sandelands, Jr.	(46,023)
Vincent G. Gioia	(19,959)	Mark Garscia	(31,953)	Heidi L. Eisenhut	(46,512)
Edward R. Schwartz	(31,135)	Gary J. Nelson	(44,257)	Nicholas J. Pauley	(44,999)
John D. Carpenter	(34,133)	Raymond R. Tabandeh	(43,945)	Mark J. Marcelli	(36,593)
David A. Plumley	(37,208)	Cynthia A. Bonner	(44,548)	Paul B. Heynssens	(P-47648)
Wesley W. Monroe	(39,778)	Jun-Young E. Jeon	(43,693)		

The authority under this Power of Attorney of each person named above shall automatically terminate and be revoked upon such person ceasing to be a member or associate of or of counsel to that law firm.

DIRECT TELEPHONE CALLS TO : Wesley W. Monroe, 626/795-9900

SEND CORRESPONDENCE TO : CHRISTIE, PARKER & HALE, LLP
P.O. Box 7068, Pasadena, CA 91109-7068

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor	Inventor's signature	Date
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Full name of third joint inventor	Inventor's signature	Date
Daniel S. Kwoh		7-19-01
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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

Docket No. 34758/WWM/I148

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Russell R. Palmer, Jr.	(22,994)	Craig A. Gelfound	(41,032)	Frank L. Cire	(42,419)
LeRoy T. Rahn	(20,356)	Syed A. Hasan	(41,057)	Harold E. Wurst	(22,183)
Richard D. Seibel	(22,131)	Kathleen M. Olster	(42,052)	Robert A. Green	(28,301)
Walter G. Maxwell	(25,355)	Daniel M. Cavanagh	(41,661)	Derrick W. Reed	(40,138)
William P. Christie	(29,371)	Molly A. Holman	(40,022)	John W. Peck	(44,284)
David A. Dillard	(30,831)	Joel A. Kauth	(41,886)	Stephen D. Burbach	(40,285)
Thomas J. Daly	(32,213)	Patrick Y. Ikehara	(42,681)	David B. Sandelands, Jr.	(46,023)
Vincent G. Gioia	(19,959)	Mark Garscia	(31,953)	Heidi L. Eisenhut	(46,812)
Edward R. Schwartz	(31,135)	Gary J. Nelson	(44,257)	Nicholas J. Pauley	(44,999)
John D. Carpenter	(34,133)	Raymond R. Tabandeh	(43,945)	Mark J. Marcelli	(36,593)
David A. Plumley	(37,208)	Cynthia A. Bonner	(44,548)	Paul B. Heynssens	(P-47648)
Wesley W. Monroe	(39,778)	Jun-Young E. Jeon	(43,693)		

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P.O. Box 7068, Pasadena, CA 91109-7068

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor	Inventor's signature	Date
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P.O. Box 438, Pasadena, California 91102-0438		US

Full name of second joint inventor	Inventor's signature	Date
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Full name of third joint inventor	Inventor's signature	Date
Daniel S. Kwoh		
Residence and Post Office Address		Citizenship
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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

Docket No. 34758/WWM/I148

Full name of fourth joint inventor	Inventor's signature	Date
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Full name of fifth joint inventor	Inventor's signature	Date
Peter Christopher Schoaff		4-2-01
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AMB PAS290243.1-*-3/21/01 11 41 AM